Annosum Root Rot

Management:

1. If Annosum is scattered throughout a stand:

a) Expect tree mortality in pockets and growth loss in trees on the pocket margin.

b) During thinnings, leave dead and dying trees on the site to minimize the movement of fruit bodies off site to uninfected areas of the state. Minimize felling and skidding wounds.

c) During salvage operations, leave dead and dying trees on the site. These trees will produce fruit bodies; leaving them on the site will minimize the movement of fruit bodies off site to uninfected areas of the state.

a) Cutting and burning dead and infected trees on the site will aid in reducing the formation of fruit bodies.

d) After harvest, infected sites may be replanted or naturally regenerated to conifers. In the southeastern United States, regeneration losses have been documented to be a total of approximately 5% with additional disease development following thinnings. This data is not yet available for Wisconsin; some losses of regeneration are expected for our area as mortality of white pine regeneration within Annosum pockets has been observed. Some deciduous trees are susceptible but tend to sustain lower mortality; conversion to hardwoods, if appropriate for the site, should be considered.

2. If Annosum is rare in a stand (one center) or if centers are widely spaced with large (>40a) blocks of healthy conifers in-between centers:

b) During thinnings, leave dead and dying trees on the site to minimize the movement of fruit bodies off site to uninfected areas of the state. Minimize felling and skidding wounds.

c) Cutting and burning dead and infected trees on the site will aid in reducing the formation of fruit bodies.

d) To limit the formation of new infection centers during thinning, there are two options: **1)** Treat all freshly cut stumps with Sporax (sodium tetraborate decahydrate[1]). Sporax will help prevent new infections but will **not stop the movement of Annosum through root systems that are already infected. 2)** Provide no treatment to the stumps and expect some infection. A native decay fungus, *Phlebiopsis gigantea*, has been known to invade freshly cut stumps and prevent successful infection by Annosum. The percentage of stumps protected naturally by *P. gigantea* is unknown.

e) After harvest, the site may be planted or naturally regenerated to conifers. (See also 1.d)

3. If Annosum is not present in the stand:

a) If you are planning a thinning, consider treating freshly cut stumps with Sporax. The risk of infection by Annosum will be higher the closer you are to infected stands. The known locations of Annosum root rot listed in this publication resulted from surveys conducted in randomly selected plantations. The probability of additional infection centers being present in Wisconsin is high.

Preventive Treatment:

Sporax has been used successfully to prevent establishment and growth of *Heterobasidon annosum* in cut stumps of conifer tree species that are **not** already infected. Sporax is a product currently registered by the EPA for this use in Wisconsin. **Stumps must be treated as soon as possible after cutting and no later than one day after cutting.** Sporax is typically applied from a container with a perforated lid. One pound of Sporax will cover 50 square feet of stump surfaces. This is equivalent to 260, 6-inch (15 cm) diameter stumps or 60, 12-inch (30 cm) diameter stumps.

Sporax is applied salt-shaker style on the surface of a freshly cut stump.

Red Pine Pocket Mortality

Management:

The factors that make any given stand more susceptible to red pine pocket decline are unknown, thus specific management recommendations have not been developed.

Relationship to Thinning:

Red pine pockets are more common in thinned stands than in unthinned stands. The increased activity of the insects known to vector *Leptographium* spp. and/or the change in microclimate following a thinning, are likely related to the initiation of this syndrome in thinned stands.

Thinning is a necessary management tool used to maintain healthy and vigorous red pine plantations. Overstocked or very dense stands of red pine are more susceptible to attack by bark beetles. Thus, **continue to thin red pine plantations as planned by a professional forester.**

Relationship to Mixed Plantings:

Red pine pocket decline has only been observed affecting red pine. Observations of stands where rows of white pine were mixed with rows of red pine have shown that pocket decline is limited to red pine, even when growing in close proximity to white pine. **Consult with a professional forester regarding your options for mixed plantings.**

Salvage:

During thinnings, salvaging declining trees along the margin of the pocket will help reduce economic losses. Harvesting additional healthy trees along the pocket margin and into the healthy stand may delay further development of symptoms for a few years. Observations have shown when this practice is followed, symptoms are delayed but do eventually recur in trees along the margin of the expanded pocket. Removing freshly cut stumps, although rarely practical, will reduce feeding sites for the root collar weevil and red turpentine beetle.

For further information, or to report the presence of Annosum root rot or Red Pine Pocket Decline, contact a member of the DNR Forest Health Protection staff.

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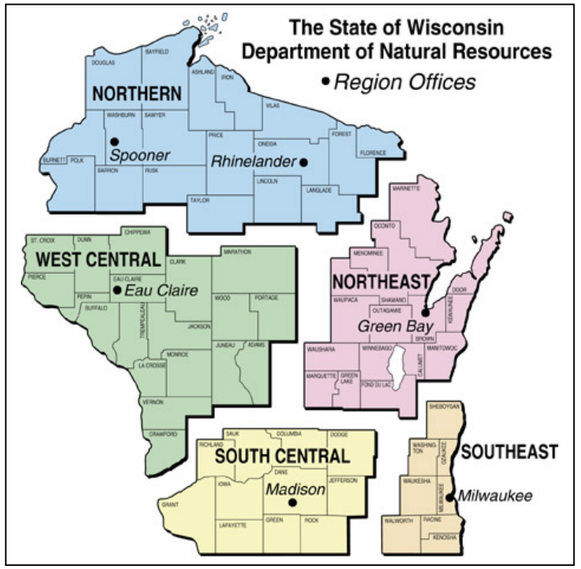

[1]Sporax is available in 25-pound bags from Wilbur-Ellis Company, P.O. Box 15289, Sacramento, CA, 95851-0289. Phone: 916-991-9846; website: www.wilbur-ellis.com.